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THE CHEMIST SERVES APPLE GROWERS AND CONSUMERS.

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A radio interview conducted by Morse Salisbury with Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils, and broadcast Wednesday, August 31, 1932, in the Department of Agriculture period of the National Farm and Home Hour by a network of 48 associate NBC radio stations.

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SALISBURY:

Farm and Home folks, I am especially happy to present to you today the Chief of the Bureau of Chemistry and Soils, Dr. Henry G. Knight. Dr. Knight is going to open a series of interviews and talks which will bring us some of the most significant and important information that has been presented in the National Farm and Home Hour.

In these talks and interviews, Dr. Knight is going to give you a series of pictures -- first, a picture of the important problems confronting the different agricultural industries which chemists can help solve; second, a picture of the research the Department chemists have under way on these problems; and third, a picture of the recent findings of this research which are of importance to you either directly or indirectly.

Today Dr. Knight has agreed to answer some of my questions and your questions on what the chemists are doing in the interests of apple growers and apple eaters. Apples are an important crop. They usually rank around 10th or 11th in value among American farm products. For pure joy in eating they rank considerably higher than 10th or 11th with many an American consumer -- yours truly included.

Now, Dr. Knight, what would you say are the main problems of the apple industry that chemistry can help to solve?

KNIGHT:

Well, Salisbury, before I answer your question, let me offer thanks for and due appreciation of your glowing introduction to my series of talks and interviews. And members of the Farm and Home Hour audience, let me disclaim to you any intention that you may think I have (after Salisbury's adequate introduction) of telling you about operations of modern magicians. I don't want you to think that there is any magic in the findings of the chemists. They simply apply hard work and ingenuity, and the principles of chemical science to the problems of the different agricultural industries.

SALISBURY:

Well, then, what are the problems of the apple industry to which the chemists are applying these principles?

KNIGHT:

Well, our chemists seem to feel that the two main problems of importance to apple producers and consumers that they can help solve are: first, the problem

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of getting satisfactory chemicals to control the insect enemies of apples; second, the problem of using the lower grade portion of the apple crop in such a way as to return a profit -- in other words, the problem of turning the apple, as a farm product, into a farm profit.

SALISBURY:

Now, Dr. Knight, will you tell us what the chemists are doing in their efforts to solve that first problem -- better chemicals for the control of insect pests of apples?

KNI GHT:

I think I hardly need to tell this audience that the present standard method of controlling the worst insect enemy of the apple crop, the codling moth, is lead arsenate. Now lead arsenate is not an entirely satisfactory chemical for controlling the codling moth. One trouble with lead arsenate is that you have to apply so much of it in a good many sections of the country that it leaves harmful residue on the ripe apples. The chemists and horticulturists and entomologists first went at this problem by developing a method of washing the apples at harvesting time to take off the spray residue. Also by devising spray schedules which leave less arsenic at harvest time. Then they worked on the proposition of using oil emulsions in conjunction with lead arsenate sprays. These emulsions hold the lead arsenate to such an extent that you don't have to apply so much of it. Our chemists are studying the characteristics of these emulsions in order to find out what types are most effective.

But they are going further. They are applying the principles of chemical science in a search for other insect poisons more effective and less troublesome than lead arsenate. They are now getting promising results from a chemical compound known as potassium fluoaluronate. They have experimented with various other chemical compounds containing fluorine.

They are also getting good results from rotenone as a codling moth killer.

I think Eisenhower has told you something about the rotenone experiments. Rotenone is a poison that we get from the roots of two species of plants used by natives of the tropics for paralyzing fish. Rotenone is not poisonous to human beings in any quantity likely to be present as a spray residue on apples. But it is very poisonous to the codling moth. Rotenone is also 15 times as poisonous as nicotine to the sucking insects of apples, such as the wooly aphids. Its main drawbacks are that it is expensive and that it deteriorates in strong sunlight.

Our chemists are trying to reduce the cost of rotenone by producing it synthetically, rather than depending upon plants. They have made the first step by determining the chemical formula of rotenone. They are also trying to find other materials which can be used in place of nicotine as a poison for sucking insects. In these researches the chemists have produced a new compound called neonicotine. Neonicotine is quite similar to nicotine and equally as poisonous to sucking insects.

SALISBURY:

Well, Dr. Knight, to sum up the work of chemists on the problem of finding more efficient controls for apple insects, is it fair to say that they have

developed new means of using the standard arsenic insect poisons that make these poisons more effective against the insects and less trouble to remove from the matured fruit; that they have synthetically made a substitute for nicotine as a poison for aphids; and that they have discovered the high efficiency of rotenone, a plant material, as a poison for aphids and for the codling moth both.

KNI GHT:

That is essentially correct, yes, Salisbury. To be exact, I think I should add that we must find ways to prevent deterioration of rotenone when it is exposed to bright sunlight in order to make it effective against the codling moth; and that we must find some way of producing it synthetically instead of from the roots of tropical plants before we can make it cheaply enough to use it commercially in apple production. Our chemists are working on both of these problems now.

SALI SBURY:

Well, now, Dr. Knight, turning to the second main problem of the apple industry that the chemists are working on, what results are they producing in their studies of ways to realize profits from the good apples that aren't quite good enough to sell as fresh fruit to the discriminating American consumers?

KNI GHT:

Well, I think all of you realize that growers nowadays sort their fruit and put only high quality apples on the market. But this sorting increases the amount of perfectly good apples -- good except for defects in shade of color, and so on -- remaining to be used. The chemical engineers have worked great improvements in the methods of manufacturing these sorted out apples into cider, vinegar, apple butter, apple jelly, and dried apples. The latest innovation of the chemical engineers is fresh, sliced apples, put up in brine so that they will not lose their bright color, and sent to bakers for immediate use or frozen and held for future use. The product of this chemical engineering idea now makes fresh green apple pie a year-around delight .

SALI SBURY:

But aren't there by-products of these by-products? For instance, when you make cider or vinegar out of apples or put up apple sauce, don't you have skins and pomace left over?

KNI GHT:

Of course you do. The 1930 census placed the amount of skins and pomace left over from manufacture of apple products at over 70 million pounds a year and most of these left-overs are now wasted.

SALI SBURY:

Is there any chance of putting them to use?

KNI GHT:

We are trying to find out.

SALI SBURY:

What have you found?

KNI GHT:

Well, some of the state experiment stations have shown that dried apple pomace and silage made from apple pomace are good stock feeds. They are similar to beet pulp or corn silage in nutritive value.

SALI SBURY:

Well, what angle of this problem are the Federal chemists working on?

KNI GHT:

For one thing they are going ahead with investigations of some possible uses of the apple skins -- 20 million pounds of them are wasted every year at industrial plants alone. They have started by determining the chemical composition of that wax-like outer coating on apple skins. They have found that this waxy coating is composed of two chemical substances. Both of them give promise of finding commercial use. For instance, by combining one of these substances with some other chemicals, you can produce a resin that makes lacquers harder and more resistant to water. Or you can use this apple product in producing the lacquer used in the manufacture of glassine papers and make the papers more resistant to absorption of moisture. Commercial concerns are making plans for exploiting these products. Another commercial concern has proposed to use one of these constituents of the waxy coating of apple skins in varnish removers. Still another possible use of these new chemical substances from the apple is in the manufacture of stencils for use in mimeograph. A number of these stencils have already been tested with good results.

SALI SBURY:

Well, how much of these chemicals could we extract from the waste apple skins and pomace in this country each year?

KNI GHT:

About half a million pounds. Let me add that the investigation of the chemical constituents of the waxy coating of apples has helped scientists and fruit growers in their efforts to solve the problems of storage of apples and removal of the spray residue from apples. This is especially important to the Pacific Northwest.

SALI SBURY:

Will you give us any more facts you have about the chemical research on apples now being carried on by your bureau, Dr. Knight?

KNI GHT:

The color investigations are the only part of the apple research that I haven't told you something about. You realize, of course, that color is certainly

important in marketing apples as fresh fruit, but perhaps you don't know that color is often associated with other important characteristics of apples, such as vitamin content, acidity, sweetness, and flavor. For these reasons, we are making an intensive study of the chemical substances responsible for apple color. We have made important progress. We have isolated and identified a parent substance from which the desirable color is produced in the fruit. We can't tell yet where this discovery will lead, but we look for important results from it.

Well, if time permitted, I would tell you more about the apple research. But Salisbury assures me that I will continue to talk with you members of the Farm and Home audience at weekly intervals this fall, so I'd better conclude this visit with you. Good-bye, until next week.

SALISBURY:

We'll be looking for you, Dr. Knight, on Friday, September 9. I understand you are going to tell us about the work of the chemists in aiding the growers and consumers of citrus fruit. Thanks very much for the interesting and important information you have given us today. And let me remind you apple growers that if you want to get detailed information on the ways in which these chemical discoveries related by Dr. Knight affect your business, you may either consult your county agricultural agent, or write to the Bureau of Chemistry and Soils, of the U. S. Department of Agriculture.

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